Heating • Piping and Air Conditioning

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As will be noted, these abstracts are classified under general heads. In looking for information on a specific subject, it will be well to look through the abstracts under the most suitable heading, and also to look through those under the other headings. For example, some of the heating articles also contain information on air conditioning, and vice versa, *as the grouping has been made on the basis of the subject most prominently covered in the article.*

The index to the Journal Section *of the* American Society of Heating and Ventilating Engineers *is separate (see page* 787).

This index does not include Equipment Developments; Book Reviews; Booklets, Reports, and Papers; Recent Trade Literature; Conventions and Expositions; Schools and Study Courses; departments appearing regularly each month. The Editor's Page in each issue includes items of news, comments on current events, etc. In the January, 1937, *issue a complete directory section was published covering heating, piping and air conditioning equipment for industry and large buildings.*

Air Conditioning

Advantages of Air Conditioning Newspaper Plants
Vol. 9, *No.* 7. *July,* 1937. *p.* 112 (*back section*).
Summary of address on air conditioning newspaper plants; press room an important application; advantages through humidification; preventing ink mist; humidifying paper storage.

Advantages of an Air Conditioned Hospital
Vol. 9, *No.* 1. *January,* 1937. *p.* 24.
Report of meeting marking complete air conditioning of Corey Hill hospital, Brookline, Mass.; preliminary consideration given to air conditioning; importance of controlling atmospheric conditions; general importance of climate on health; rheumatic fever and heart diseases.

Air Conditioning for Food Plants
Vol. 9, *No.* 10. *October,* 1937. *p.* 658.
Abstract of paper by James Holt presented at food technology conference at Massachusetts Institute of Technology; requirements of food plants for air conditioning; advantages; use of air conditioning for meat in cooler storage.

Air Conditioning for Hospitals and in Normal Life
Vol. 9, *No.* 2. *February,* 1937. *p.* 96.
Review of papers presented by Philip Drinker and C. P. Yaglou at Harvard University symposium on the environment and its effects upon man; objectives and extent of air conditioning now applied to hospitals; conditions required; miscellaneous uses; application of air conditioning in normal life.

Air Conditioning Influences Building Design, by J. H. Walker
Vol. 9, *No.* 10. *October,* 1937. *p.* 599.
New service building being erected by the Detroit Edison Co., Detroit, Mich.; glass brick for exterior walls; heat and light transmission characteristics of glass brick; effect of air conditioning on cost of building; lighting coordinated with air conditioning; air conditioning windowless buildings; calculated refrgeration load; typical floor plan; diagram showing method of air circulation.

Air Conditioning in the Tropics Presents New Engineering Problems, by J. Neal Clemmer
Vol. 9, *No.* 9. *September,* 1937. *p.* 562.
General discussion of air conditioning requirements in the Philippines; comparison with practice in the United States; types of building construction and effect on air conditioning; acceptance of air conditioning.

Air Conditioning Load a Reason for New Gas Rate
Vol. 9, *No.* 4. *April,* 1937. *p.* 220.
New gas motor service rate established by Peoples Gas Light and Coke Co., Chicago, Ill.; reasons for establishing rate; terms.

Air Conditioning Society of San Francisco Adopts Standards for Air Conditioning
Vol. 9, *No.* 11. *November,* 1937. *p.* 122 (*back section*).
"California Standards of Air Conditioning for Human Comfort" adopted by Air Conditioning Society of San Francisco printed in full except for introductory section on definitions of terms.

Annual Air Conditioning Review
Vol. 9, *No.* 1. *January,* 1937. *p.* 31.
Number of air conditioning installations and connected horsepower for 1935, 1936, and totals as of December 1, 1936 for various cities; estimated increases predicted for 1937; number of air conditioned railroad cars and types of systems installed.

Applying Air Conditioning to an Existing Building, by M. Kennedy
Vol. 9, *No.* 10. *October,* 1937. *p.* 630.
Method of air conditioning the Brix building, Fresno, Calif.; design conditions; no moisture tonnage problem involved; how ducts were installed; advantages of horizontal corridor duct design over vertical riser method; each floor divided into two zones with volume regulation through dampers with gear controls; atmospheric cooling tower; "Freon" refrigeration equipment.

As Others See Us—an Englishman Studies American Air Conditioning, by John Pryke
Vol. 9, *No.* 9. *September,* 1937. *p.* 537.
Informal report of travels in U. S.; points of interest to air conditioning and heating engineers; photographs.

Blower Filter Unit Solves Press Room Problem, by F. S. Robinson
Vol. 9, *No.* 11. *November,* 1937. *p.* 665.
Installation at Benham and Munday printing plant, Indianapolis, Ind.; material from spray guns to prevent offset drifted throughout plant atmosphere; blower filter unit and duct work collects material; results.

Builds Air Conditioned Film Warehouse, by H. W. Sachs
Vol. 9, *No.* 11. *November,* 1937. *p.* 680.
Air conditioned warehouse of Agfa Ansco Co., Binghamton, N. Y.; temperature and humidity conditions; use of well water; brief description of air conditioning system; insulation and double glazing; glass block air conditioned office building.

Cold Weather Responsible for Printing Paper Troubles
Vol. 9, *No.* 1. *January,* 1937. *p.* 10.
Printing papers require certain handling precautions in cold weather; importance of temperature and humidity.

Condensing Water for Air Conditioning City Hall Is Put Back in Supply Main, by Joe Stocker
Vol. 9, *No.* 9. *September,* 1937. *p.* 548.
Air conditioning system for Oklahoma City city hall; condensing water returned to supply main; drawing of condensing water piping; pumps; temperature rise; safety provisions; charging for use of water; other articles of related interest.

Controls (Reference Sheet 6), by C. L. Ringquist
Vol. 9, *No.* 2. *February,* 1937. *p.* 111.
Four control layouts for cooling, ventilating and dehumidifying systems with diagrams and explanation of control cycles.

Controls (Reference Sheet 7), by C. L. Ringquist
Vol. 9, *No.* 3. *March,* 1937. *p.* 177.
Four control layouts for cooling, dehumidifying, ventilating and humidifying systems diagrammed; operating cycles explained.

Controls (Reference Sheet 8), by C. L. Ringquist
Vol. 9, *No.* 4. *April,* 1937. *p.* 245.
Three control arrangements for heating, ventilating, dehumidifying and cooling systems; operating cycles explained.

Controls (Reference Sheet 9), by C. L. Ringquist
Vol. 9, *No.* 5. *May,* 1937. *p.* 313.
Five control arrangements for heating, humidifying, ventilating, dehumidifying and cooling systems, and explanation of cycle of operation of each.

Controls (Reference Sheet 10), by C. L. Ringquist
Vol. 9, *No.* 6. *June,* 1937. *p.* 375.
Five arrangements of zone control systems with explanation of cycle for each.

Controls (Reference Sheet 11), by C. L. Ringquist
Vol. 9, *No.* 7. *July,* 1937. *p.* 435.
Three zone control arrangements with description of operating cycle of each.

Determining Presence of Chromates
Vol. 9, *No.* 12. *December,* 1937. *p.* 724.
Answer by C. M. Sterne to reader's question; procedure for determining presence of chromates in a solution with diphenyl carbazide; test very sensitive.

Don't Forget Air Conditioning Maintenance, by C. T. Baker
Vol. 9, *No.* 11. *November,* 1937. *p.* 674.
Importance of regular inspection and examination of air conditioning plants; example; loss of capacity due to infiltration; loss of capacity due to lack of insulation; dirty air filters; importance of proper location of outside air intake.

Effect of Air Conditioning Industry on Distribution
Vol. 9, *No.* 10. *October,* 1937. *p.* 658.
Review of paper presented by L. R. Boulware at Boston conference on distribution; use of air conditioning in tapping untouched supplies of raw materials; personnel relationships; buyer-seller relationships.

Effect of City Water Supply and Sewer Systems on Air Conditioning Reported
Vol. 9, *No.* 8. *August,* 1937. *p.* 480.
Description of report issued by Bureau of Foreign and Domestic Commerce; available water facilities of U. S. cities; table of temperature of water at main outlet and normal mean air temperature during summer months for cities of 100,000 population and over. (Also see p. 720, November, 1937, issue).

Electricity Used by Air Conditioning, by William P. Rock
Vol. 9, *No.* 4. *April,* 1937. *p.* 239.
Survey based on monthly meter readings for air conditioning installations in Chicago show how much electricity is used by air conditioning equipment; basis of survey; monthly kilowatthour and kilowatt readings for residential and commercial installations of various types; graphs; weather conditions.

Estimating the Potential Market for Commercial Air Conditioning, by Knight C. Porter and William P. Rock
Vol. 9, No. 1. January, 1937. p. 8.
Potential market for commercial air conditioning estimated for city of Chicago; installations plotted on map show their location in better economic areas; data on present electrical load, average load per store, per cent of total load on electric utility's lines, number of installations in each classification, and corresponding figures for market saturation for drug stores, beauty parlors, candy stores, restaurants, undertakers, and theaters; charts show connected horsepower for air conditioning and number of installations for prior to 1933, 1933, 1934, 1935, and 1936.

E. Vernon Hill's Personal Comments
Vol. 9, No. 5. May, 1937. p. 299.
Informal comments on increasing complexity of design of air conditioning systems because of the many types of equipment available; comments on the writing of air conditioning codes.

E. Vernon Hill's Personal Comments
Vol. 9, No. 6. June, 1937. p. 362.
Importance and duties of air conditioning operating engineers, service engineers and consulting engineers; definite classification of engineers and their respective duties would be of value.

E. Vernon Hill's Personal Comments
Vol. 9, No. 7. July, 1937. p. 414.
Air conditioning calculations simplified by specifying air quantities by weight instead of volume; elimination of use of relative humidity; comments on the word "ventilation".

E. Vernon Hill's Personal Comments
Vol. 9, No. 8. August, 1937. p. 496.
Remarks on how the human body controls its temperature; variation in temperature of the extremities; importance of medical research on the subject to air conditioning engineers.

E. Vernon Hill's Personal Comments
Vol. 9, No. 9. September, 1937. p. 564.
Discussion of vagueness of the words "heat" and "cold"; sensible heat; latent heat; superheat.

E. Vernon Hill's Personal Comments
Vol. 9, No. 10. October, 1937. p. 610.
No such thing as "saturated air"; mixtures of air and water vapor; relative weights; relative humidity.

E. Vernon Hill's Personal Comments
Vol. 9, No. 11. November, 1937. p. 666.
Difficulties in making capacity tests on air conditioning installations because of unsuitable outside conditions; method should be developed for making tests under changed conditions for fulfilling guarantees.

E. Vernon Hill's Personal Comments
Vol. 9, No. 12. December, 1937. p. 733.
Discussion of servicing air conditioning jobs and the functions and qualifications of the man engaged in servicing work; importance of proper servicing.

Five Air Conditioning Plants for World's Fair Building, by H. G. Schaefer
Vol. 9, No. 5. May, 1937. p. 310.
Brief description of World's Fair of 1939 in New York City; heating, ventilating and air conditioning equipment being installed.

Ford Motor Company Sets High Air Conditioning Standards, by J. J. Floreth
Vol. 9, No. 12. December, 1937. p. 729
Ford large user of comfort and process air conditioning; conditions air for workers' comfort; some Ford installations; establishment of Ford standards; temperature and humidity design conditions; materials; motors; workmanship and appearance; ducts, piping, grilles, etc.; procedure in bidding and awarding contracts; air condition assembly lines?

Frank Lloyd Wright Designs Air Conditioned Office Building for S. C. Johnson & Son
Vol. 9, No. 1. January, 1937. p. 185 (back section).
Brief description of general features of unusual office building for S. C. Johnson and Son, Inc., at Racine, Wis.; year round air conditioning provided for; panel heating.

Gas as a Source of Power for Air Conditioning, by B. A. Johnson
Vol. 9, No. 5. May, 1937. p. 298.
Use of gas engines as source of power for refrigeration for air conditioning; types of equipment available; comparing cost of gas engine power with electric power; chart.

Germicide in Spray Water Reduces Bacteria in Air
Vol. 9, No. 4. April, 1937. p. 230.
Brief abstract of paper describing experiments on treating air washer water for reducing bacterial content; the ideal germicide; applications.

Graphical Method for the Design of Exhaust Systems, by Arthur Nutting
Vol. 9, No. 1. January, 1937. p. 21.
Chart eliminates arithmetical calculations in design of exhaust systems by permitting friction losses and air quantities to be plotted graphically; basis of chart; detailed explanation and typical example showing use; theory of method; factors involved in exhaust system design; full page two color reproduction of chart.

Guest Room Air Conditioning Expected to Create Hotel Business
Vol. 9, No. 5. May, 1937. p. 308.
Four St. Louis, Mo., hotels have air conditioned guest rooms; brief description and cost; competition will not cancel benefits of air conditioning.

Hospital Air Conditioning Requirements Outlined
Vol. 9, No. 10. October, 1937. p. 607.
Review of article by Dr. C. A. Mills on the more important principles of hospital air conditioning; summer and winter requirements; cooling operating rooms; air cleaning; recirculation; radiant heating and cooling.

Hospital Air Conditioning System Maintains Low Relative Humidities, by A. J. Lawless
Vol. 9, No. 3. March, 1937. p. 155.
Corey Hill hospital, Brookline, Mass., completely air conditioned for treatment of patients suffering from arthritis or other rheumatic fevers; lower than usual relative humidities necessary and no general air recirculation; design requirements; air distribution scheme; central conditioning plant; operation of lithium chloride dehumidifier; three control zones; advantages of method used; schematic drawing of system.

Hotel Air Conditioning Visualized
Vol. 9, No. 3. March, 1937. p. 151.
Diagram visualizing total number of rooms in U. S. hotels and number now air conditioned; similar information for public and leased spaces in hotels.

How Can We Stop Corrosion of Our Air Conditioning Equipment?
Vol. 9, No. 7. July, 1937. p. 422.
Reader's question on corrosion in ammonia refrigeration plant used in conjunction with industrial air conditioning system; methods tried for control of acidity of water; treatment of water recommended; use of dichromate; concentration; discussion of question by C. M. Sterne; tests made on carry-over; proper pH to maintain.

How Much Air Conditioning?, by William P. Rock
Vol. 9, No. 5. May, 1937. p. 309.
Survey of ultimate market for summer air conditioning in Chicago and its possible effect on the power company; number of present installations and estimated number of future installations; present and future air conditioning kilowatts and kilowatthours.

How Should These Offices Be Air Conditioned?
Vol. 9, No. 12. December, 1937. p. 728.
Question on winter and year around air conditioning of typical suite of offices; readers invited to submit recommendations for publication.

How to Avoid Trouble on Cooling Jobs With Evaporators Above Condensers, by William Goodman
Vol. 9, No. 3. April, 1937. p. 221.
(Part 1); general discussion of problem; pressure in a vertical "Freon" pipe line; saturation pressures of "Freon"; how to insulate; computing pressure at any point in line; example; chart for finding final gage pressure at top of vertical pipe line of liquid "Freon".

How to Avoid Trouble on Cooling Jobs with Evaporators Above Condensers, by William Goodman
Vol. 9, No. 5. May, 1937. p. 303.
(Part 2); selecting expansion valves; expansion valve ratings; example showing computations for pressure drop in "Freon" pipe lines; effect of refrigerant density on valve capacity; chart for density of mixtures of liquid "Freon" and vapor; examples showing method of solution of problems.

How to Avoid Trouble on Cooling Jobs With Evaporators Above Condensers, by William Goodman
Vol. 9, No. 6. June, 1937. p. 355.
(Part 3); methods of preventing liquid from flashing into vapor—subcooling, use of a pump, eliminating vertical liquid line, use of a heat exchanger; no loss of refrigerating capacity when using heat exchanger; diagrams showing various methods; chart for finding percentage of liquid by weight in mixture of "Freon" liquid and vapor.

How to Solve Heat Transfer Problems, by William Goodman
Vol. 9, No. 1. January, 1937. p. 11.
(Part 1); information needed on use of heat transmission coefficients; limitations of the basic formula; three main divisions of problems; the various classes of problems; condensing or vaporizing fluids; table of data which facilitates solving problems; curves showing principle of heat transfer when one fluid is condensing or vaporizing; examples showing detailed solution of problems.

How to Solve Heat Transfer Problems, by William Goodman
Vol. 9, No. 2. February, 1937. p. 89.
(Part 2); solution of heat transfer problems involving parallel flow; formula for parallel flow and examples showing use; chart illustrating temperature changes which occur in both fluids as they flow past the heat transfer surface.

How to Solve Heat Transfer Problems, by William Goodman
Vol. 9, No. 3. March, 1937. p. 165.
(Part 3); solution of heat transfer problems involving counterflow; formulas; examples showing solutions in detail; diagrams illustrating for counterflow temperature changes which occur in both fluids; appendix showing derivation of formulas.

How to Solve Heat Transfer Problems, by William Goodman
Vol. 9, No. 3. March, 1937. p. 179.
Data sheets summarizing series of three articles on solving heat transfer problems; formulas; illustrative example; tabular data facilitating solution; diagrams illustrating temperature changes that occur in the various types of problems. Also see page 146, back section, April, 1937, issue.

Ice Cools New Apartment Building, by E. O. Young (with Francis A. Westbrook)
Vol. 9, No. 8. August, 1937. p. 484.
Method of cooling Larchmere-Moreland apartment building in Cleveland, Ohio; description of ice using cooling units; cost of installation; detail drawings of unit.

Intake Louvers Are of Stainless Steel
Vol. 9, No. 12. December, 1937. p. 736.
Brief description and illustration of penthouse on S. H. Kress & Co. building, New York, N. Y.; stainless steel air intake louvers fabricated by oxy-acetylene welding.

Large Hotel Air Conditioning Job, by John B. Hewett
Vol. 9, No. 3. March, 1937. p. 160.
Description of air conditioning of Harrington hotel, Washington, D. C.; design conditions and construction characteristics; shades and insulation reduce heat gain; system of indirect central type using well water and condensing units; operation and control of the system; zone control; installed cost; cost of operation and depreciation; operating results; psychrometric chart and design of cooling coils; air distribution.

Looking Ahead in Railroad Air Conditioning, by C. C. Elmes
Vol. 9, No. 9. September, 1937. p. 549.
Number of railroad passenger cars and number of those air conditioned; studies made by Association of American Railroads; future developments in railroad air conditioning; power requirements; types of systems; control; air cleaning devices; survey of passenger reactions to air conditioning.

Low Pressure Exhaust Steam Chills Water for Building Air Conditioning
Vol. 9, No. 6. June, 1937. p. 370.
Steam jet refrigeration air conditioning installation at Otis building, Chicago, Ill.; building generates own power; principle of steam jet vacuum cooling; description and illustrations of equipment at Otis building; four spray type dehumidifier units; air handling equipment.

Modernized with Air Conditioning, by Frank A. Merrill (with Francis A. Westbrook)
Vol. 9, No. 5. May, 1937. *p.* 306.
Modernization of Rice Building, Boston, Mass.; design of air conditioning system; air circulation; advantages of air conditioning; conditions maintained.

New Charts Simplify Splitter Design, by R. D. Madison
Vol. 9, No. 3. March, 1937. *p.* 152.
Reducing pressure losses in short radius elbows with splitters; charts for design of splitters; use of charts.

New Idea in Air Conditioning
Vol. 9, No. 5. May, 1937. *p.* 294.
Illustrations of manufacture of compressors for new central refrigeration plant furnishing chilled water for air conditioning several buildings in Washington, D. C.; chilled water piped through underground mains.

Office Building Air Conditioning Pays Health Dividends
Vol. 9, No. 5. May, 1937. *p.* 305.
Survey showing health advantages of air conditioning of Tribune Tower, Chicago; reduction in absenteeism due to illness; chart showing days lost by employees before and after air conditioning.

Office Building Cleans Air Electrically
Vol. 9, No. 11. November, 1937. *p.* 676.
Installation of electrostatic precipitators in Field building, Chicago, Ill.; capacity; computation of dirt that will be removed; principle of operation of electrical precipitation unit, with illustrations and diagrams; industrial uses; recovery of glaze in automatic glaze spraying machines.

Owner's View of Air Conditioning, by Arthur Behrstock
Vol. 9, No. 9. September, 1937. *p.* 555.
Experiences of Walgreen Drug Co. with air conditioning; number of stores air conditioned and investment in air conditioning; advantages; problems in cooling the drug store; new Miami store; sales increases attributed to air conditioning.

Owner's View of Air Conditioning, by J. J. Cogan
Vol. 9, No. 11. November, 1937. *p.* 664.
Experience of R. H. Macy & Co. (department store) with air conditioning; space air conditioned and investment; 1500 tons of refrigeration; centrifugal refrigeration machines driven by steam turbines; operating policy; balance with outside conditions; advantages of air conditioning department stores.

Plant Motor Survey Pays, by R. W. Orth
Vol. 9, No. 1. January, 1937. *p.* 49.
Example of value of survey of plant electrical conditions; method of making tests.

Practical Air Conditioning Laboratory Designed to Yield Information on Control and Other Subjects, by J. E. Haines
Vol. 9, No. 1. January, 1937. *p.* 41.
Description of air conditioning system for executive offices of Minneapolis-Honeywell Regulator Co.; believed to be one of the most complete experimental systems in the world; detailed discussion of controls; central control panel and instrument board; schematic diagram of one of the systems; installation to be used in determining comfort zone and studying air distribution and filtration.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 5. May, 1937. *p.* 281.
(Part 1); elementary information on air conditioning for beginning air conditioning engineers; review of basic principles; definitions of dry bulb temperature, dew point temperature, absolute humidity, relative humidity, wet bulb temperature, total heat, air volume, etc.; formulas.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 6. June, 1937. *p.* 367.
(Part 2); sensible heat; formulas; air distribution and temperature differential; types of air outlets.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 7. July, 1937. *p.* 415.
(Part 3); description and reproduction of Carrier psychrometric chart; examples showing use; total heat of air; change in relative humidity; vapor pressure and absolute humidity.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 8. August, 1937. *p.* 488.
(Part 4); meaning of the term latent heat; latent heat load in air conditioning; air required to pick up latent heat; total heat load; formulas and examples; table showing properties of saturated water vapor with air.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 9. September, 1937. *p.* 553.
(Part 5); outside air requirements and refrigeration load; quantity of outside air required per person for various spaces; method of making calculations; method of computing refrigeration load; bypass system; refrigeration requirements with and without bypass compared.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 10. October, 1937. *p.* 632.
(Part 6); the survey and general procedure; items that should be included on air conditioning survey form.

Practical Standards for Air Conditioning Calculations, by W. S. Bodinus
Vol. 9, No. 11. November, 1937. *p.* 693.
(Part 7); illustrative example of air conditioning of tavern and club room worked out in detail; heat calculations; heat load; bypass arrangement and air quantity; duct layout and sizes.

Printers Need Air Conditioning
Vol. 9, No. 8. August, 1937. *p.* 124 (*back section*).
Summary of article on advantages of air conditioning printing plants; typical installations and specific use of air conditioning; comparisons with operation before air conditioning was applied.

Problem of Condenser Water for Large Air Conditioning Plants, by E. Vernon Hill
Vol. 9, No. 4. April, 1937. *p.* 233.
Central district water supply system of Chicago; capacity; map; sewer system; solution of problem of providing and removing condensing water for air conditioning plants; amount of water required; details of suggested condenser water connection to return water to supply main; benefits to be derived by using suggested method.

Pumping Head on Air Conditioning Systems Reduced by Using Siphon, by William Goodman
Vol. 9, No. 7. July, 1937. *p.* 418.
(Part 1); general discussion of type of installation article applies to; reduction in head on pump; pressure at top of vertical discharge pipes; design of vertical discharge pipes; formula and its use; diagrams of installations.

Pumping Head on Air Conditioning Systems Reduced by Using Siphon, by William Goodman
Vol. 9, No. 8. August, 1937. *p.* 477.
(Part 2); long vertical drop of discharge pipes; when a pump may be omitted in installations of the type discussed; location of automatic valves; filling piping system with water; continuity of operation of system.

Put Your Air Conditioning Plant in Shape for Summer Operation, by Rush D. Touton
Vol. 9, No. 5. May, 1937. *p.* 291.
Summer months represent period of maximum load on air conditioning plants; importance of putting plant in condition for efficient operation; inspect the building structure; air distribution system; test the refrigeration plant; heat transfer surfaces; off-peak storage; air washers; controls of major importance.

Rational Psychromatics, by E. Vernon Hill
Vol. 9, No. 10. October, 1937. *p.* 621.
Proposed new temperature scales simplify air conditioning calculations; use of a psychrometer with the new scales; a heat unit psychrometric chart; use of chart in solving problems in air mixtures, cooling, and determining the heat ratio; reproduction of the simplified chart.

Rayon and Air Conditioning, by L. L. Lewis
Vol. 9, No. 6. June, 1937. *p.* 347.
(Part 1); detailed description of manufacture of rayon; viscose process; flow sheet; temperature and humidity requirements for each step; year round air conditioning essential.

Rayon and Air Conditioning, by L. L. Lewis
Vol. 9, No. 7. July, 1937. *p.* 427.
(Part 2); continuation of description of various steps in the manufacture of rayon by the viscose process; temperature and humidity requirements; acetate and celanese process; weaving and other uses of synthetic yarns; air conditioning requirements of the processes.

Refutes Idea That Air Conditioning Will Cause Water Shortage
Vol. 9, No. 11. November, 1937. *p.* 720.
Typographical error in recent government report on water requirements of air conditioning plants; probable water consumption for air conditioning less than one per cent of total water requirements of U. S. cities.

Restaurant Presents Peculiar Heat Gain Problem, by Lester T. Avery
Vol. 9, No. 2. February, 1937. *p.* 105.
Solutions to problem of removing heat from restaurant equipment; insulation; air delivery in restaurant; special precautions where exhaust system is connected in kitchen; providing make-up air.

Retail Store Air Conditioning Surveyed
Vol. 9, No. 10. October, 1937. *p.* 602.
Review of current issue of "Air Conditioning Trends"; how air conditioning aids in solution of retail store problems; factual basis for approaching problem of selling air conditioning to department stores; example of how air conditioning increases store profits; use of air conditioning by chain stores.

Rule-of-Thumb for Scientific Duct Design, by Henry G. Schaefer
Vol. 9, No. 11. November, 1937. *p.* 678.
Simplified method of designing ducts; comparison with other methods; use of chart and tables; example.

School Administration Building Is Air Conditioned
Vol. 9, No. 9. September, 1937. *p.* 556.
Brief description of year around air conditioning system for school administration building at Fresno, Calif.

Show Window Ventilation, by Lester T. Avery.
Vol. 9, No. 12. December, 1937. *p.* 741.
Show windows need ventilation to prevent condensation, keep temperatures within reasonable limits, keep out dirt; description of system for show windows at Cleveland Electric Illuminating Co.; amount of lighting and heat gain from lights; system comprises supply and exhaust fans and filters; method of operation and control; isometric diagram.

Silica Gel Air Conditioning System Serves Rotogravure Printing Plant, by Herbert E. Ryerson
Vol. 9, No. 8. August, 1937. *p.* 497.
Description of rotogravure printing process; illustrations of various steps; silica gel air conditioning system at Kable Brothers Co., Mt. Morris, Ill.; flow diagram for air conditioning system; conditions maintained; operation of system; typical detail of branch take-off from main duct; brief description of similar system for cough drop manufacturing plant (F & F Laboratories, Inc., Chicago, Ill.).

Silicosis and Allied Disorders
Vol. 9, No. 2. February, 1937. *p.* 88.
Program for protecting health of industrial workers and plan of medical research for curbing industrial disease recommended to Air Hygiene Foundation; outline of report for guidance of employers; comments amplifying report; nine things definitely known regarding silicosis.

Simple Way to Analyze Performance of Compressor-Evaporator Combinations, by William Goodman
Vol. 9, No. 12. December, 1937. *p.* 737.
When air conditioning compressors and evaporator coils are connected, they act as a single unit and the operating conditions of one affect the other; why compressor's capacity varies with suction pressure; why coil capacity varies; combining characteristic curves for compressors and coils; effect of varying air conditions and air velocities; effect of compressor speed; use of two coils and one compressor; function of back pressure valve for maintaining constant pressure in evaporator; how back pressure valve affects capacity of system; typical characteristic curves for "Freon" compressors and coils.

Simplified Method for Solving Air Washer Problems, by Dr. J. R. Zwickl
Vol. 9, No. 9. September, 1937. *p.* 557.
Cooling air by spray type coolers or air washers; equation for heat balance; water requirements; types of air washers;

graphic methods for solving single stage air washer problems; counterflow two stage, and two stage split spray air washer problems; curves and examples.

Statler Service at St. Louis Includes Air Conditioned Guest Rooms

Vol. 9, No. 1. January, 1937. p. 50.

Brief description of air conditioning system at Hotel Statler, St. Louis, Mo.; water chilled by direct expansion ammonia; water circulating pumps and coolers; room cooling units; guest can control unit.

Sterilising Air, by A. R. Dennington

Vol. 9, No. 5. May, 1937. p. 288.

Excerpts from recently presented paper; experimental installation of sterilizing lamp at Duke University hospital; tests made; results; possible future applications.

This Air Conditioner Installation Is Noisy, by Samuel R. Lewis

Vol. 9, No. 9. September, 1937. p. 544.

Answer to reader's question about noisy suspended type air conditioner; sketch of installation; recommendations for improvement; use of sound absorbing material.

Treatment of Disease by Air Conditioning to Be Studied by A.S.H.V.E. in 1937 Research, by Brewster S. Beach

Vol. 9, No. 1. January, 1937. p. 40.

Brief description of research on treatment of diseases by air conditioning to be conducted by A.S.H.V.E.; summary of research investigations of A.S.H.V.E.

Unique Air Conditioning System Serves New Industrial Building, by Robert E. Hattis

Vol. 9, No. 2. February, 1937. p. 97.

Windowless, completely air conditioned building for research laboratories and offices of National Aluminate Corp., Chicago, Ill.; air conditioning system of novel design; why windowless construction was adopted; air conditioning essential; details of installation—equipment for pumping cool well water to coils, pumping and supplying hot water, controlling flow of water to coils; heat losses and heat from lights compared; power requirements and cost of operation of system; basement plan and section view showing duct layout.

Units Mounted Above Stage Air Condition Movie House

Vol. 9, No. 10. October, 1937. p. 617.

Brief description of method of installing air conditioning in Isis theater, Fort Worth, Texas.

University of Illinois Installs New Experimental Conditioning Equipment, by William H. Severns and M. K. Fahnestock

Vol. 9, No. 4. April, 1937. p. 227.

Detailed description of installation of air conditioning equipment for experimental and research use; restricted duct sections for determining air velocities; damper and temperature controls; elevation and plan drawings of system; summary of equipment; types of problems for which apparatus is suitable.

What Air Conditioning Means to the Retailer, by Verdn Jensen

Vol. 9, No. 1. January, 1937. p. 48.

Trend in air conditioning drug stores; number of installations in Chicago; Sutliff and Case drug store, Peoria, Ill.; increase in sales after air conditioning; other advantages; problems in air conditioning drug stores.

What Does Air Conditioning Mean to Industry? by Samuel R. Lewis

Vol. 9, No. 2. February, 1937. p. 106.

Examples of what air conditioning means in various industrial processes—food preparation, manufacture of pencil refills, manufacture of chocolates, printing, manufacture of cosmetics; preventing condensation on steel in storage.

What of the Future of Air Conditioning? by Walter L. Fleisher

Vol. 9, No. 1. January, 1937. p. 1.

Importance of air conditions on health recognized by ancients; what air conditioning is; interesting analogy between bakery and comfort air conditioning; inconsistencies in present air conditioning practice; human being an intricate combustion machine; use of evaporative cooling methods; radiant heating and cooling; map of midsummer wet bulb temperatures for United States; table of summer temperatures; A.S.H.V.E. comfort or effective temperature chart.

What's the Cost of Air Conditioning? by Rex E. Hieronymus

Vol. 9, No. 5. May, 1937. p. 295.

Analysis of air conditioning system for two-story taxpayer type building, Chicago, Ill.; partial list of mechanical equipment; type of air conditioning system; reasons for its selection; putting plant in operation; cost analysis of air conditioning for heating season and cooling season; comparison of cost with ordinary heating system; diagram showing essential elements of system.

Heating

Accurate Method for Control of Heating Fuel Costs, by W. S. Bard

Vol. 9, No. 8. August, 1937. p. 473.

Methods of recording consumption of steam or fuel for heating institutional building groups; applying statistical methods to month-by-month comparisons; normal consumption curves; quartile deviation; deviation ratio; monthly report; yearly report; monthly steam consumption curves for buildings with various types of normal steam consumption curves; effect of other than heating uses of steam in consumption trends.

After the Flood—Restoring Equipment to Service, by Samuel R. Lewis

Vol. 9, No. 2. February, 1937. p. 108.

Cleaning boilers, piping, tanks, pumps; brick work and concrete; motors; bearings; examining boilers for cracks; insulation; protecting tanks against damage from flood.

American Practice in Panel Heating, by Leon L. Munier

Vol. 9, No. 7. July, 1937. p. 424.

General description of advantages of panel heating and design of systems; lower air temperatures maintained; installation of panels; determining panel area; method of plastering important; the patent situation; use of radiant heat in greenhouses and for plant culture outside of building.

Automatic Weigher Records Coal for Heating School

Vol. 9, No. 6. June, 1937. p. 350.

Equipment for weighing and automatically recording coal used for heating new Southwestern high school, St. Louis, Mo.

Btu Required for Heating Air

Vol. 9, No. 11. November, 1937. p. 684.

Table showing quantity of heat in Btu required to raise one cubic foot of air through any given temperature interval.

Combustion Chambers for Oil Fired Boilers, by Kalman Steiner

Vol. 9, No. 6. June, 1937. p. 351.

General data on combustion chambers for oil fired boilers; heat release per cubic foot of volume; rules for firebox construction; shape of combustion chamber; combustion volume a controversial point; secondary air port area; diagrams and tables showing combustion chamber dimensions for firebox construction, for cast iron sectional, firebox, Scotch marine, steel tubular and horizontal return tubular boilers.

Controls, by C. L. Rinquist (Reference Sheet 5)

Vol. 9, No. 1. January, 1937. p. 39.

Diagrams of three typical control arrangements for heating, ventilating and humidifying systems; cycle of operation of each.

Electric Heating System Defrosts Store Windows, by W. F. Mainguy

Vol. 9, No. 11. November, 1937. p. 675.

Problem of defrosting store windows in Quebec; experiences with electric tubular heater; unit heaters; method adopted comprises perforated duct along base of window through which is blown electrically heated air; wattage requirements.

Glycerine Solves Boiler Scale Problem

Vol. 9, No. 2. February, 1937. p. 104.

Glycerine found useful in preventing or retarding formation of boiler scale; method of use; results of tests.

Heating a Bunkhouse, by Samuel R. Lewis

Vol. 9, No. 4. April, 1937. p. 148 (back section).

Reader's question on heating industrial plant bunkhouse answered; plan and section; design temperature; heating service water by condensation; radiation and piping; sizing steam reducing valve.

Heating Fuel Consumption Data, by Kalman Steiner

Vol. 9, No. 10. October, 1937. p. 618.

General discussion of methods of making comparisons of heating fuel consumption data; complications; measure of good performance indefinite; steam requirements for heating office buildings; effect of design temperature; data on fuel requirements for heating theaters; allowing for differences in climate; variations in fuel use.

Heating System Control Methods and Reducing Fuel Consumption, by Kalman Steiner

Vol. 9, No. 3. March, 1937. p. 170.

Typical methods of controlling heating systems that operate exclusively upon the heating system; firing device left under control of pressurestat on boiler; radiator orificing; correcting piping defects in heating systems; fuel consumption estimates and comparison; listings of economies which can be effected through operation and maintenance of heating plants, and by changes in heating systems and building construction.

Heating System Control Methods for Reducing Fuel Consumption, by Kalman Steiner

Vol. 9, No. 2. February, 1937. p. 85.

Necessity of control for heating systems; general methods of control, particularly with oil burners; detailed descriptions of four methods of control using available commercial equipment.

Heat Recovery System to Reduce Laundry Steam Consumption, by V. F. Alley

Vol. 9, No. 5. May, 1937. p. 308.

Diagram and brief description of heat recovery system for laundry; incoming city water heated in primary and secondary economizers.

How Heat and Ventilate a Garage? by Samuel R. Lewis

Vol. 9, No. 7. July, 1937. p. 423.

Answer to reader's question on method of heating and ventilating office space in a garage; suggested damper arrangement.

Improving Heating Plants, by Rex E. Hieronymus

Vol. 9, No. 5. May, 1937. p. 302.

Brief remarks on how to go about improving operation of heating plants; program of improvement should never be completed.

Investigations by Federal Bureaus of Texas School Explosion Summarized

Vol. 9, No. 6. June, 1937. p. 358.

Investigations of school explosion at New London, Texas, by U. S. Bureau of Mines; recommendations of specialists; report of Dr. David J. Price; school heated by gas fired radiators.

Making Steam Do Double Duty, by F. J. Vonachen

Vol. 9, No. 5. May, 1937. p. 289.

Possibilities of improving plant heat balance by using steam engines for driving fans and compressors; adaptability of the steam engine; operating costs; study of a steam engine driving a ventilating fan at a school; types of applications.

New Type of Unit Furnishes Heat and Power to Ford's Valve Plant

Vol. 9, No. 10. October, 1937. p. 608.

"Steamotive"; steam electric generating unit at Northville, Mich., valve plant of Ford Motor Co.; operating data on boiler efficiency; water content; unit is oil fired; design of unit and advantages; auxiliaries.

New York's New Building Code, by Walter L. Fleisher

Vol. 9, No. 11. November, 1937. p. 682.

Brief remarks on provisions of new New York City building code affecting heating, ventilating, air conditioning, and its allied branches; quotations from code; index for ventilation of various spaces.

Performance of Heaters and Coolers Under Changed Operating Conditions, by Bayard P. Fonda

Vol. 9, No. 4. April, 1937. p. 237.

Method of calculating performance of air heating and cooling surface when operating conditions are changed; formulas; examples; applying method to other gases or liquids.

Selecting the Right Size Heating Boiler, by Sabin Crocker

Vol. 9, No. 6. June, 1937. p. 373.

Articles on heating boiler selection summarized in data sheet form; factors affecting selection; absorbing capacity of boiler surface; manufacturers' ratings; approximate heat emission, condensation factors, and equivalent ratios for various types of radiating surfaces; conversion factors for computing heat

emitted by radiation and equivalent known radiation; chart showing variation with pipe size of rate of heat transfer through various thicknesses of 85 per cent magnesia insulation and through bare pipe.

Selecting the Right Size Heating Boiler, by Sabin Crocker
Vol. 9, No. 7. July, 1937. p. 437.
Information on selecting heating boilers in data sheet form; computation of boiler load due to piping; table of heat emission from horizontal bare iron or steel pipes in air at 70 F; graph showing heating power of brass and iron pipe coils in water storage tanks.

Selecting the Right Size Heating Boiler, by Sabin Crocker
Vol. 9, No. 8. August, 1937. p. 501.
Information on selecting heating boilers in data sheet form; computation of load due to domestic hot water requirements; table of water heating loads vs. temperature rise for various rates; satisfactory warming up period; table showing warming up allowance for boilers for various loads.

Selecting the Right Size Heating Boiler, by Sabin Crocker
Vol. 9, No. 9. September, 1937. p. 565.
Information on heating boiler selection in data sheet form; the warming up problem; computing the time required for warming up; tables of weights of pipe and fittings, weights of boilers and water content, and weight, of cast iron radiators.

Selecting the Right Size Heating Boiler, by Sabin Crocker
Vol. 9, No. 10. October, 1937. p. 611.
Information on selection of heating boilers in data sheet form; use of performance curves; fuel burning rate; grate area; typical values for square feet of boiler heating surface per square foot of grate area; combustion rates for coal fired boilers; recommended setting heights for stoker fired boilers.

Selecting the Right Size Heating Boiler, by Sabin Crocker
Vol. 9, No. 11. November, 1937. p. 687.
Information on heating boiler selection in data sheet form; rule for furnace volume; oil fired boilers; gas fired boilers; furnace heights for stoker fired boilers.

Setting Up a Heat Economy Program, by Rex E. Hieronymus
Vol. 9, No. 1. January, 1937. p. 25.
In most buildings heating represents largest single commodity purchase after electricity and payroll; economic purchase and utilization of heat units a problem which naturally divides into two phases; how to set up and carry forward program to assure economic and efficient heating service; recording temperatures; determining average monthly space temperature; importance of daily records; don't be alarmed at occasional complaints; basement economy important; checking fuels on "Btu per dollar" basis; automatic coal burning equipment; improvement in economy due to stokers over a period of years; importance of instruments for keeping track of fuel, steam, feedwater, and flue gas; if inefficient equipment is being operated, new equipment is really being paid for whether the building has it or not; high points of one economy program for a group of buildings; effect of CO_2 on fuel economy.

Sewage Disposal Plant Makes Own Fuel
Vol. 9, No. 12. December, 1937. p. 732.
La Crosse, Wis., sewage disposal plant uses gas from digester tanks for heating building and for process requirements; gas used in internal combustion engine; jacket water, heated by exhaust, piped to unit heaters and convectors.

Superheated Water System Heats New Swiss Buildings, by R. Ruegg
Vol. 9, No. 4. April, 1937. p. 224.
New cantonal administration buildings at Zurich, Switzerland; general discussion of the heating problem; method of heating the water; diagram of connections for supplying superheated water from district heating power station; temperature regulation; the distribution system and the building heating systems; charging for heat.

Technical Problems in Analyzing Fuel Consumption, by W. S. Bard
Vol. 9, No. 9. September, 1937. p. 541.
Heating steam consumption determined by three groups of factors; variables involved; application of statistical method of comparing fuel consumption data; mathematical treatment of curves; the degree day; advantages and disadvantages of the factor "pounds of steam per degree day"; the factor "pounds of steam per degree day per thousand cubic feet of building space"; limitations in accuracy of factor.

Turbines for Heat Balance Purposes, by S. O. Maxwell
Vol. 9, No. 5. May, 1937. p. 290.
Possibilities of obtaining economical power by using steam turbines to drive centrifugal refrigeration machines; characteristics; various installations.

Unit Heaters Speed Drying of Cleaned Garments, by Ben Maxwell
Vol. 9, No. 4. April, 1937. p. 236.
Installation of unit heaters in dry cleaning plant for drying solvent cleaned and laundered garments; location of units; advantages of method.

Ventilating and Heating Store Windows, by Richard Brunel
Vol. 9, No. 8. August, 1937. p. 495.
Remarks answering reader's question for information on ventilating and heating requirements of show windows; conditions in a closed show window; frosting of windows; high summer temperatures; lighting load; methods of preventing condensation on windows.

What's the E.D.R. of Indirect Heating Surface? by William S. Downs
Vol. 9, No. 11. November, 1937. p. 667.
Distinction between actual heating surface area and equivalent direct radiation; heating steam requirements of Irving Trust Co. building, New York, N. Y.; computing equivalent direct radiation of blast heating coils; use of information in comparing steam consumption data.

World's Biggest Building Installs New Heating and Combustion Control, by W. A. Stahl
Vol. 9, No. 12. December, 1937. p. 721.
Size of Merchandise Mart, Chicago, Ill.; no zone or combustion control when built; first step installation of flow meters; heating system and combustion control and instruments; payments based on fuel savings; terms of contract; correction factors for occupancy; eight control zones; outside thermostats and reducing valves; controlling stokers; variable speed stoker drives; indicated fuel saving 22 per cent.

Piping

Accessibility of Service Piping Features Aircraft Assembly Plant
Vol. 9, No. 4. April, 1937. p. 242.
New Seattle, Wash., plant of Boeing Aircraft Co.; piping services in tunnels; method of heating; fire protection; unit heaters.

Correct Piping Layout Important for Diesel Engine Installations, by C. T. Baker
Vol. 9, No. 7. July, 1937. p. 420.
General recommendations for piping for diesel engine installations; exhaust piping; water and oil piping; use of cooling towers; pumps; filtering intake air.

Corrosion of Condensate Return Lines, by J. H. Walker
Vol. 9, No. 6. June, 1937. p. 366.
Underground condensate return lines at a university being corroded; brief answer to the question; recommendations for testing for corrosion and making water analysis.

Creep Testing of Metals, by J. J. Curran
Vol. 9, No. 9. September, 1937. p. 551.
Importance of creep of metals; creep requirements which must be met by valves and fittings; creep rate; creep testing; the specimen; the machine; types of electric furnaces used.

Flow Meter Installation, by Louis Gess and J. O. Feldmark
Vol. 9, No. 2. February, 1937. p. 103.
Location of flow meter orifice; use of straightening vanes; diagrams of two types of vanes; measuring pulsating flow; method of eliminating pulsations caused by reciprocating water pumps.

Ford Centralizes Control of New Gas Distribution Piping
Vol. 9, No. 7. July, 1937. p. 411.
Piping is an industrial transportation system; electrically operated control system for new gas distribution piping at Rouge plant, Ford Motor Co., Dearborn, Mich.; description of system; diagram of main gas consuming units and control valves; centralized control essential; how control system operates.

Formulas for Stresses in Bolted Flanged Connections, by E. O. Waters, D. B. Wesstrom, D. B. Rossheim and F. S. G. Williams
Vol. 9, No. 6. June, 1937. p. 363.
(Part 1); increasing importance of methods of design of flanged piping connections; review of earlier work; basis of the present study; analysis of stress distribution; types of flanges to which formulas apply.

Formulas for Stresses in Bolted Flanged Connections, by E. O. Waters, D. B. Wesstrom, D. B. Rossheim and F. S. G. Williams
Vol. 9, No. 7. July, 1937. p. 431.
(Part 2); formulas and discussion of design of flanges; tapered hub flange without hydrostatic pressure; development of design formulas; graphs showing values for use in formulas.

Formulas for Stresses in Bolted Flanged Connections, by E. O. Waters, D. B. Wesstrom, D. B. Rossheim, and F. S. G. Williams
Vol. 9, No. 8. August, 1937. p. 485.
(Part 3); tapered hub flange with hydrostatic pressure and no bolt load; illustrative problems; graphical results of examples.

Formulas for Stresses in Bolted Flanged Connections, by E. O. Waters, D. B. Wesstrom, D. B. Rossheim, and F. S. G. Williams
Vol. 9, No. 9. September, 1937. p. 545.
(Part 4); fillets and their design; comparison of various formulas; tests; bibliography on flange design.

How Do You Know the Bolts Are Tight and Not Too Tight?
Vol. 9, No. 8. August, 1937. p. 476.
Anonymous comment on tightening bolts for flange connections; need for a torque wrench.

How Pipe Is Made
Vol. 9, No. 3. March, 1937. p. 154.
Brief description of various processes for manufacturing pipe, including seamless process, rotary rolled seamless process, lap weld process and butt weld process; operations in converting round solid bar to seamless pipe.

How Steam Storage Can Be Applied to Process Steam Piping Systems
Vol. 9, No. 11. November, 1937. p. 685.
Use of steam accumulator at a typical plant; installation; method ideal for variable loads; prevents excessive pressure drop in piping; diagrams of steam storage systems for a paper mill and a brewery.

How to Operate Centrifugal Pumps
Vol. 9, No. 4. April, 1937. p. 231.
Information abstracted from "Standards" issued by Hydraulic Institute; priming; priming by foot valve; priming by vacuum pumps; starting and stopping; check list for locating pump troubles of various kinds.

Importance of Design Control for Welded Piping Systems, by T. W. Greene
Vol. 9, No. 2. February, 1937. p. 92.
A.S.A. code for pressure piping and its requirements for minimum thickness of pipe wall for threaded pipe and for welded pipe; maximum allowable working pressures; stress in pipe for different pressures; pressure stresses around nozzles; superimposition of bending stresses; tests of power piping header; stress relieving of piping; weld quality; use of liners.

Improving Plant Piping Systems, by Walter E. Hume
Vol. 9, No. 5. May, 1937. p. 285.
General discussion of importance of improving piping systems; economy in use of steam; inspection of piping; insulation; cost of leaks; use of exhaust steam; auxiliary equipment; expansion of piping; reducing valves.

Measuring Steam Consumption of Paint Drying Coils
Vol. 9, No. 1. January, 1937. p. 188 (back section).
Answer to question on method of determining steam requirements of paint drying coils.

New Data for Refrigeration Piping Design (Ammonia Liquid Line Piping), by R. C. Doremus
Vol. 9, No. 12. December, 1937. p. 725.
Importance of proper ammonia piping; properties of ammonia; piping materials; methods of making joints; welded installations; gaskets; unions; sizing liquid line piping; expansion and shut-off valves; pressure drops in valves; installations where evaporator is above compressor; lubrication; specifications for oil; table of recommended pipe sizes.

New Data for Refrigeration Piping Design ("Freon" Liquid Line Piping), by R. C. Doremus
Vol. 9, No. 8. August, 1937. *p.* 492.
"Freon" liquid line piping; properties of "Freon"; piping materials; recommended liquid line sizes for various tonnages; pressure drop; lubrication; oil recovery; graphs showing pressure drop vs. capacity for liquid "Freon-12" through thermal expansion valves and solenoid shut-off valves.

New Data Aids Refrigeration Piping Design ("Freon" Suction Line Piping), by R. C. Doremus
Vol. 9, No. 9. September, 1937. *p.* 533.
Properties of "Freon" vapor; pressure drops for various tonnage capacities through 100 ft. of copper pipe for saturated gas at 0 F and at 41 F; pressure drop in equivalent length of pipe due to valves and fittings; example of use of data; velocity chart for vapor at various suction temperatures for copper piping of different diameters, in feet per minute per ton of refrigeration; importance of proper pipe sizing.

New Data for Refrigeration Piping Design (Methyl Chloride Liquid Line Piping), by R. C. Doremus
Vol. 9, No. 10. October, 1937. *p.* 603.
Importance of proper design of refrigeration piping; properties of methyl chloride; piping materials; expansion valves; magnetic shut-off valves; lubrication and oil recovery; pressure-temperature curves for ammonia, "Freon 12," and methyl chloride; siutable pipe sizes for liquid lines; pressure drop curves for liquid methyl chloride through thermal expansion valves and solenoid shut-off valves.

New Data for Refrigeration Piping Design (Methyl Chloride Suction Piping), by R. C. Doremus
Vol. 9, No. 11. November, 1937. *p.* 669.
Characteristics of methyl chloride vapor; pressure drops of methyl chloride vapor for various tonnage capacities in copper pipe for saturated gas at 0 F and 41 F; example showing design of piping for large market; tons capacity of suction piping; pressure drop due to valves and fittings; velocity chart for methyl chloride suction vapor at various suction temperatures for copper piping of different diameters, in feet per minute per ton of refrigeration; foolish economy to skimp on piping.

New Method of Studying Erosion Aids Selection of Valve Seat Materials, by Fred R. Venton
Vol. 9, No. 1. January, 1937. *p.* 34.
Erosion of valves; earlier test methods; better method devised and described; test results summarized; specimens classified by crater depths; group classification of specimens according to depth of impression; illustrations of typical specimens; general information on selection of valve seating materials.

Nut and Bolting Materials for High Pressure and High Temperature Piping Service, by Harvey A. Wagner
Vol. 9, No. 3. March, 1937. *p.* 147.
Two specifications recently adopted by American Society for Testing Materials; bolting material; properties of steel; identification symbols; performance of joints at service temperature; creep strength; threads; nut material; checking physical properties; dimensions; identifying marks; comparison of corresponding sizes of American standard regular and heavy nuts; chemical compositions and physical properties of steels for high temperature service; chemical requirements for carbon steel nut material; pitch diameter for 1 in. bolt and nut; Brinell hardness of nuts.

Piping for 3500 Lb Steam, by H. L. Solberg
Vol. 9, No. 6. June, 1937. *p.* 360.
Experimental steam generating unit at Purdue University; can be operated at pressures up to 3500 lb per sq in., maximum steam temperature of 830 F; description of unit; screwed piping connections; flanged connections; performance of joints; ¾ in. throttling valve with ring joints; advantages and disadvantages of various joints.

Proper Installation of Centrifugal Pumps
Vol. 9, No. 5. May, 1937. *p.* 300.
Abstract of standards issued by Hydraulic Institute; location of pump; alignment; grouting; piping and valves; stuffing boxes and packing; bearings; miscellaneous.

Properties of Pipe, by Arthur McCutchan
Vol. 9, No. 4. April, 1937. *p.* 247.
Tables of properties of pipe published in data sheet form; significance of properties tabulated; use of tables.

Properties of Pipe, by Arthur McCutchan
Vol. 9, No. 5. May, 1937. *p.* 315.
Tables of properties of pipe in data sheet form.

Recent Changes in National Piping Standards, by Sabin Crocker and Harvey A. Wagner
Vol. 9, No. 10. October, 1937. *p.* 613.
(Part 1); analysis of recent piping standards; dimensional standards—steel flanged fittings and companion flanges, face-to-face dimensions of flanged valves; welding fittings, screw threads, pipe plugs, flanged ammonia fittings, cast iron pipe flanges and flanged fittings, sprinkler fittings, hose couplings, soil pipe and fittings, wrought iron and wrought steel pipe, code for pressure piping; proposed ring and groove dimensions for carbon steel flanges; tables of ratings for carbon steel flanged fittings and companion flanges with standard facings; table of proposed adjusted ratings for American steel flanged standards when made of carbon-molybdenum steel.

Recent Changes in National Piping Standards, by Sabin Crocker and Harvey A. Wagner
Vol. 9, No. 11. November, 1937. *p.* 659.
(Part 2); development of materials specifications for piping; specifications for pipe, castings, forgings, bolting; chemical and physical properties of alloy pipe materials for high temperature service, and for alloy steel castings materials; chemical and physical properties of alloy steel bolting materials for high temperature service; new specifications for boiler tubes.

Ring Joint—Its Relative Merit and Application, by E. C. Petrie
Vol. 9, No. 4. April, 1937. *p.* 213.
General discussion of problem of maintaining tight flange joints with high pressures and temperatures; comparison of ring joint and flat gasket type; general characteristics of ring joint connection; effective pressure area; results of comparative tests; interpretation of test results and test data; effect of flange thickness, width of ring, shape of ring; determining width of ring section; torque-tress relationship for alloy steel bolts, and coarse threaded bolts; tables of ring dimensions for 150, 300, 400, 600, 900, 1500, and 2500 lb flanges and oil field flanges.

Romans Had a Technique for It (Early Manufacture of Lead Pipe), by F. E. Wertheim
Vol. 9, No. 9. September, 1937. *p.* 561.
Methods used by Romans for early manufacture of lead pipe; illustrations of pipe sections; making joints; etched section of pipe.

Significance of the Reynolds Number
Vol. 9, No. 2. February, 1937. *p.* 102.
Excerpt from address by Prof. B. A. Bakhmeteff; two types of fluid motion; the transition zones; analogy explaining Reynolds number; the Reynolds diagram.

Solving Piping Flow Problems, by William Goodman
Vol. 9, No. 10. October, 1937. *p.* 625.
(Part 1); eliminating cut-and-try methods when using the Reynolds' number; definition of Reynolds' number; modified Reynolds' numbers for finding flow through a pipe and required pipe diameter; friction factor chart; table of various formulas; use of formulas and curves; computing the flow; flow with changing density; viscosities of a few liquids, gases and vapors; table of constants for use in formulas—inside diameters of standard weight steel pipe and type L copper tubing and diameters to the 3/2 and 5th powers.

Solving Piping Flow Problems, by William Goodman
Vol. 9, No. 11. November, 1937. *p.* 689.
(Part 2); eliminating cut and try methods when using the Reynolds' number; formulas and examples; criterion for applying formula; critical pressure in a pipe line; appendix showing derivation of formulas.

Strength and Design of Covers and Flanges for Pressure Vessels and Piping, by T. McLean Jasper, H. Gregersen and A. M. Zoellner
Vol. 9, No. 1. January, 1937. *p.* 43.
(Part 3); comparison of results from formulas and test flanges; variation of external moment with flange thickness and fillet radius; variation of external moment with hub thickness and fillet radius; variation of external moment with flange width; influence of bolt holes and of hub length on hubbed flanges; graphs showing test points and theoretical curves.

Strength and Design of Covers and Flanges for Pressure Vessels and Piping, by T. McLean Jasper, H. Gregersen and A. M. Zoellner
Vol. 9, No. 2. February, 1937. *p.* 109.
(Part 4); bolt loads; relation between flange load per bolt and wrench turning moment for bolts; numerical examples showing design of cover, ring flange and hubbed flange; arrangement of flange and loading equipment in testing machines.

Strength and Design of Covers and Flanges for Pressure Vessels and Piping, by T. McLean Jasper, H. Gregersen, and A. M. Zoellner
Vol. 9, No. 3. March, 1937. *p.* 174.
(Part 5); appendix reporting test results on plaster of paris models; tabulated data on tests of ring flanges and hubbed flanges; illustrations of specimens after testing.

Strength and Design of Covers and Flanges for Pressure Vessels and Piping, by T. McLean Jasper, H. Gregersen and A. M. Zoellner
Vol. 9, No. 4. April, 1937. *p.* 243.
(Part 6); fillet coefficients; location of gasket; curves showing variation of bending moment with distance from junction between ring and hub in small and large hubbed flanges.

Strength and Design of Covers and Flanges for Pressure Vessels and Piping, by T. McLean Jasper, H. Gregersen and A. M. Zoellner
Vol. 9, No. 5. May, 1937. *p.* 311.
(Part 7); history of flange theories; tests on plaster of paris models of hubbed flanges.

Ten Mile Industrial Pipe Line Conveys 8,000,000 Gallons of Water Per Day
Vol. 9, No. 8. August, 1937. *p.* 479.
Brief description of large pipe line for paper mill of Southern Kraft Corp., Georgetown, S. C.; spiral welded pipe 24 in. in diameter; coated; method of laying pipe; couplings.

Valves—a Review of Available Types and Their Features, by F. H. Morehead
Vol. 9, No. 12. December, 1937. *p.* 734.
(Part 1); importance of valves; early types and applications; early gate valve; globe valve with wooden disc and sliding stem; general classification of valves based on flow characteristics and opening and closing mechanisms; general features of globe and gate valves; screwed and flanged ends.

Welded Fabrication of Manifolds and Special Fittings for Piping, by Sabin Crocker
Vol. 9, No. 1. January, 1937. *p.* 15.
Advantage of fabricated parts for high pressure, high temperature welded power plant piping; comparison with cast fittings; various examples described and illustrated; fabrication of welded manifold; mitering and bevelling; reinforcement of branch openings; typical example for reinforcement, with formula for computing minimum pipe wall thickness; importance of sound welds; chart showing limits of sizes of unreinforced openings in cylindrical shells.

Welded Piping System for Handling Syrup
Vol. 9, No. 1. January, 1937. *p.* 187 (*back section*).
Interesting pump and piping system of welded construction at corn syrup products manufacturing plant; number of welds; flow diagram of system.

Welding Society Publishes Standard Welding Symbols
Vol. 9, No. 8. August, 1937. *p.* 487.
Brief description and reproduction of fusion welding symbols adopted by American Welding Society.

Windmills Protect Pipe from Corrosion
Vol. 9, No. 5. May, 1937. *p.* 293.
Counteracting electrolytic corrosion of underground pipe lines by impressing voltage from outside source; method of application; windmills used to generate current.

X-Ray Inspection of Field Welded Pressure Piping, by Herbert R. Isenburger
Vol. 9, No. 6. June, 1937. *p.* 369.
Importance of x-ray inspection of welded piping; feasibility of making examination in the field; method employed on one project; portable x-ray unit.

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